

linkage upon a single depression of said toggle plate assembly by said rider.

42. The pedal of claim 38 having additionally, a gripping means for facilitating said rider actuated articulation of said support linkage from said binding retracted position to said binding extended position, comprising a finger grippable feature on a generally rearward portion of each said binding,

Remarks - General:

This amendment C is presented in response to the Office Action mailed on December 12, 2002.

Record of Telephone Conversation:

Preliminary Amendment B was mailed December 10, 2002, just prior to receipt of the Office Action of December 12, 2002. Applicant acknowledges, that, via a phone conversation with Examiner held on February 13, 2003, Preliminary Amendment B, was subsequently entered into the record. Applicant further acknowledges, from said phone conversation, that Preliminary Amendment B, though entered into the record, was nonresponsive to the Office Action of December 12, 2002, and that Applicant would subsequently provide a full response to the Office Action of December 12, 2002 (or abandon the application).

Specification:

The paragraph describing the invention of Ueda '931 is modified to be consistent with the revised definition of relative height between a binding and an unbound shoe supporting surface presented in claim 30 of this amendment. This revised

height definition provides a more meaningful, and less ambiguous height definition that accurately reflects the actual interface between a cycling shoe and a pedal in proper operating configuration.

The paragraph describing a variant of the preferred embodiment whereby shoe support surfaces **15**, are slightly higher, and links **42'** are made slightly longer, to provide for further retraction of the bindings into the body, is removed from the Conclusions, Ramifications, and Scope section and added to the Description section of the specification (in the 3rd paragraph of page 17 of the original application). This variant, being fully described, and shown in a new figure 8, and supporting the recitation in claim 30 of an unbound mode whereby the height of the bindings is lower than the heights of the corresponding shoe supporting surfaces, is thusly more properly presented in the Description.

In the same above paragraph, a revised method of determining the heights of both bindings and shoe supporting surfaces is added, for explanation of the dimensions shown on new figure 8 which illustrate this method.

Drawings:

A new figure 8 is presented for consideration, replacing the original figure 8, which was drawn to a variation of the preferred embodiment having only one binding, which applicant acknowledges as being an obvious variation of the preferred embodiment, and is thusly withdrawn. The new figure 8 shows a variation of the preferred embodiment that provides for having the clipless bindings retract to a height substantially lower than the height of the corresponding shoe supporting surfaces. This variation of the preferred embodiment comprises only minor dimensional changes of several components, and was specifically described in the Conclusions, Ramifications and Scope section of the original application. As such, no new material has been introduced by the addition of this new figure 8.

New figure 8 also shows, using dashed lines, the bindings in extended position

for use in clipless binding mode. Figure 8 also shows the revised method of measuring the heights of both bindings and shoe supporting surfaces as recited in claim 30, and also described in the specification by this amendment.

Claims:

Applicant has rewritten all claims to define the invention more precisely and distinctly so as to overcome the technical rejections and define the invention patentably over the prior art.

Claim 30 replaces claim 1 as a first independent claim, generic to both Species and their equivalents, comprising the essential invention. Claim 30 is now written in a proper "means plus function form" as was originally intended. Claim 30 is restructured to further separate out features nonessential to the essence of the invention. The original claim 1 recited a single means for both attaching bindings and/or shoe supporting surfaces to the spindle and for providing variable height. Means for rotatably attaching the bindings and/or shoe supporting surfaces to the spindle and means for providing variable binding and/or shoe supporting surface height need not be related to each other, and linking these two functions is nonessential to the fundamental inventive concept of providing relative height variability between these two elements. Thusly, recitation of a means for rotatably attaching bindings and or shoe supporting surfaces to the spindle is removed from the recitation of a means for providing relative height variability between these two elements, and made antecedent to it. Furthermore they are recited as two separate means, to allow, but not restrict them to be separate independent elements.

In claim 30, a more precise and functional definition of the heights of both bindings and shoe supporting surfaces is utilized. Since there are many possible ways to provide relative height variability between a binding and a corresponding shoe supporting surface, these revised height definitions are provided to avoid ambiguity in determining such heights and relative height differences. Furthermore they provide a more meaningful and accurate representation of the interface between a typical cycling

shoe and a pedal, both in proper pedaling configuration. With such a definition, it is possible to more accurately ascertain whether or not a supposed relative height variability between a binding and a corresponding shoe supporting surface is sufficient to provide both unbound and clipless binding operation.

In particular, a rigid cylindrical surface (cylinder), having a specific radius corresponding to that of a typical cycling shoe, under the forefoot, is substituted for a plane. The cylindrical surface is a gauge that provides a measure of the height of a shoe supporting surface that will be consistent and accurate in describing the position of an unbound supported shoe, regardless of whether the shoe supporting surface is a cage type surface, supporting a shoe sole only on locations substantially in front of, and to the rear of the ball of the foot or cleat, as in the alternative embodiment, or a platform type shoe supporting surface providing shoe sole support directly under the ball of the foot, on each side of the cleat, as in the preferred embodiment.

Furthermore, the cylindrical surface "gauge" (cylinder), is constrained to have its axis parallel to the spindle axis as this not only eliminates any uncertainty in its orientation but best represents a foot neutral position when supported on the pedal. The cylinder is further constrained be tangent to the shoe supporting surface by being fully impressed against the shoe supporting surface. This application of pressure aligns the shoe supporting surface to the cylindrical gauge, by rotation about the spindle axis to reliably give a minimum distance from the shoe sole to the pedal axis. This action further eliminates ambiguity in determining the shortest distance from the spindle axis to the shoe supporting surface. In addition, it provides a height definition that corresponds to the actual height of a shoe supporting surface that a cycling shoe will "see" under actual use.

Furthermore, the height of the binding is measured by the same cylindrical "gauge", in order to represent an actual shoe sole which might come in contact with the top surfaces of the binding. Since safe, secure and efficient pedaling can only be performed when the ball of the foot is over, or slightly in front of the pedal spindle axis, the cyclist will strive to place the cylindrically curved part of the shoe, represented by the

cylindrical surface gauge, over the pedal spindle, whether in clipless binding mode, or in unbound mode. Thusly, the cylindrical gauge for measuring the height of the binding is constrained to move with its axis held in a plane defined by the spindle axis and the cylinder axis, as in the position of measuring the height of the shoe supporting surface.

In claim 30, a recitation in section (j) --" without regard to the position of shoe placement upon either of said shoe supporting surfaces."-- is added to the definition of unbound mode of operation in order to distinguish the safe, efficient, and comfortable form of unbound operation provided by the present invention, from other claimed forms of unbound operation which require foot placement upon the pedal to be substantially deviant and askew from normal foot placement, and thusly not capable of providing safe, comfortable or efficient unbound mode operation.

Claims 31-34 replace dependent claims 2, 3, 5, and 6, respectively, including those amended by Preliminary Amendment B. Claim 34, originally intended to cover the cage style platform surface of Species II, also reads on the textured shoe supporting surface of the preferred embodiment, and its equivalents, and is thusly retained. Claims 35-37 replace dependent claims 8-10, respectively, including those amended by Preliminary Amendment B. Claims 31-37 are amended to be consistent with regards to the new recitations of claim 30. They are otherwise unchanged from their original counterparts.

In Preliminary Amendment B, claim 8 was added to cover possible variations described in the Conclusions, Ramifications, and Scope section of the specification whereby equivalents could comprise binding elements that are formed continuous with elements of a support linkage or mechanism. Applicant wishes to further point out that claim 8 (new claim 35) also covers and reifies the preferred embodiment (Species I) in which binding base **34** forms an essential and integral part of the variable height support linkage **43** as well as an essential and integral part of the binding **32**. Note that the presence of binding base **34** completes the articulating parallelogram type linkage, without which, such an articulating motion is not possible. This illuminates and clarifies the concept that any interpretations of the present invention, or its equivalents, which

seek to draw a dividing line between a binding and a means for supporting it, must not disallow elements common to both.

Claims 38-42 are added to provide explicitly structural claims for the elected Species I (preferred embodiment) of the original application, along with possible variants, as an alternative to the "means plus function" structural recitations of claims 30-39. Claim 38 is independent and Claims 39-42 are dependent on claim 38.

With Regards to the Examiner's Requirement for Restriction (Items #2&3):

2. The requirement for restriction is based on Examiner's finding that Species I and Species II are patentably distinct from each other. More specifically, Examiner cites that Species I (fig. 1A) comprises bindings that are height adjustable relative to height stationary shoe supporting surfaces, whereas Species II (fig. 11A) comprises shoe supporting surfaces that are height adjustable relative to height stationary bindings. Applicant concurs that the current requirement for restriction is proper until a generic claim is allowed. Applicant wishes to keep the designation of Species I as the Elected Species.

3. There currently being no allowed generic claim, Applicant thusly withdraws claim 4 from consideration. Examiner has indicated, in the Office Action of 8/29/02 that claim 1 is generic to both Species. Notwithstanding the errors in claim 1 cited elsewhere in the office action, Applicant submits that claim 30, rewritten to comply with the other technical objections cited by the examiner, is essentially the same generic claim that claim 1 was intended to be, and should thus be allowed as generic to the two Species of the invention.

With regards to the Examiner's Objections to the Specification/Abstract (Item #5):

The original abstract submitted is shortened to comply with MPEP § 608.01b by

omitting the second paragraph. The second paragraph was not meant to be an adjunct to the first paragraph, but was mistakenly provided as an alternate abstract which provides a detailed recitation of the structure, as opposed to the first paragraph, which provides a succinct functional description. Since the essence of the invention is of providing a fundamentally new combination of functionality, rather than merely providing an improvement of an existing design, the first paragraph is more appropriate to keep as an Abstract.

With regards to the Examiner's Objections to the Drawings (Item #6) :

6a. Examiner's objection is that the drawings do not show bindings being lower than corresponding shoe supporting surfaces, as recited in claims 1 and 5. The Conclusions, Ramifications and Scope section of the application, as originally filed, contains a description of a variant of the preferred embodiment (Species I) whereby links **42** are made longer (increasing the distance between pins **38F**, **38R** and **44**, and thusly increasing the height of the binding primarily in the extended position only), and shoe supporting surfaces **15** are located at a corresponding greater height relative to the pedal spindle axis. Thusly, the relative height between bindings and corresponding shoe supporting surfaces does not change when bindings are in the extended position, but is increased over the preferred embodiment when bindings are in the retracted position, as the increased length of links **42** is directed to be almost wholly orthogonal to the height direction of the corresponding shoe supporting surface.

This variant is the basis of the recitation in claims 1 (new claim 30) and 5 (new claim 33) for the (top surfaces of the) bindings being lower than corresponding shoe supporting surfaces. Applicant submits a revised drawing for consideration. Figure 8 of the application as originally filed, which was drawn to claim 7 (which is withdrawn by this amendment), may be replaced by this new figure 8 showing the variant of the preferred embodiment, as fully described in the Conclusions, Ramifications, and Scope section of the original application. The new figure 8 shows a pedal with the bindings **32**

retracted for operation in unbound mode. The two dimensional changes described above allow the top surfaces of the bindings **32** to be substantially lower than the corresponding shoe supporting surface **15** surrounding it when the bindings **32** are retracted for use of the pedal in unbound mode. No change occurs in the relative heights of the bindings **32** with respect to their corresponding shoe supporting surfaces **15** when the pedal is set to operate in clipless binding mode. This variant of the preferred embodiment is clearly described in the Conclusions, Ramification and Scope Section of the Application as originally filed, and nothing is shown in the new Figure 8 which has not been previously been described in the original application. As such, no new matter has been introduced by the addition of this drawing.

Note that claim 9 (new claim 36), having unbound operation without contact of cleat on binding, and claim 10 (new claim 37), having clipless binding operation without sole contact on pedal, are covered by the preferred embodiment, as shown in figures 1-7, as well as being covered by the above mentioned variant shown in new figure 8. For a fully sole recessed cleat, it is generally sufficient that the height of the bindings be level with the height of the shoe supporting surfaces to allow unbound operation without contact of cleat with pedal, as shown in the preferred embodiment. It is also generally sufficient that, for clipless binding operation without contact of the shoe sole with any part of the pedal, the height of bindings must exceed the height of the corresponding shoe supporting surfaces by a distance greater than the depth of recess, as shown in the preferred embodiment.

6b. claim 7 is withdrawn from consideration as being an obvious variation of the invention, as per item 14. As such figure 8, which illustrated claim 7, is withdrawn and replaced by a new figure 8, as mentioned above in 6a.

With regards to Rejections of Claim 5 under USC § 112 (Item #8):

Claim 5 has been withdrawn and is replaced by claim 33.

8a. Claim 5 recited a "mechanism for automatically changing the relative height of the clipless shoe bindings relative to the shoe supporting surfaces" instead of a "means for automatically changing the relative height of the clipless shoe bindings relative to the shoe supporting surfaces" thus making the claim narrative. Claim 33 recites a "means" instead a "mechanism" to properly comply with the requirements of USC § 112 ¶6 .

8b. The recitation "upon release" was inadvertently omitted immediately preceding the recitation "of said clipless shoe binding cleat from said clipless shoe binding" from Claim 5. Claim 33 rectifies this error to claim a pedal which can be preset to convert to unbound mode when the cleat is released from the binding, without any other action taken by the rider.

With regards to Rejections of Claims 1-7 under USC § 112 (Item #10):

10a. Examiner rejects claim 1 as being narrative in form. Applicant acknowledges Claim 1 was narrative in form; Claim 1 is canceled and replaced by claim 30 which is written to include "means plus function" type recitations of structure, where appropriate, in compliance with the requirements of USC § 112 ¶6.

10b. Applicant acknowledges the recitation of "either position" in claim 1 to be indefinite. Claim 1 is canceled and replaced with Claim 30 in which precise definitions of both binding and shoe supporting surface height are substituted, and the two positions of bindings relative to shoe supporting surfaces are defined. These are described in the next paragraph (10c) below.

10c. Applicant acknowledges the recitation of "(perpendicular)" to be indefinite. The recitation of "(perpendicular)" was intended to be redundant to the recitation "shortest distance", rather than further limiting the distance between the pedal spindle axis and the plane of the shoe supporting surface or uppermost surfaces of the clipless shoe bindings. Claim 30 eliminates this indefinite height definition and substitutes a precise definition of the heights of both the clipless bindings and the shoe supporting

surfaces. In particular, a cylindrical surface (first cylinder), having a specific radius corresponding generally to that of the forefoot portion of the sole of a typical cycling shoe is substituted for a plane. This provides a measure of the height of a shoe supporting surface that will be consistently accurate in describing the position of an unbound supported cycling shoe, regardless of whether the shoe supporting surface is a cage type surface, which supports a shoe sole only on locations substantially in front of, and to the rear of the ball of the foot or cleat, as in the alternative embodiment, or a platform type shoe supporting surface which typically provides shoe sole support directly under the ball of the foot, on each side of the cleat, as in the preferred embodiment.

Furthermore, this cylindrical surface "gauge" is constrained to have its axis parallel to the spindle axis as this requirement not only eliminates any uncertainty in its orientation, but best represents a neutral foot position when supported on the pedal, with the rider's weight distributed evenly across the transverse width of the shoe supporting surface. Such an even weight distribution is essential to provide for safe, secure, efficient, and comfortable pedaling. The first cylinder is further constrained to be tangent to the shoe supporting surface by being fully impressed against the shoe supporting surface. This application of pressure aligns the shoe supporting surface to the cylindrical gauge, by rotation about the spindle axis to reliably give a minimum distance from the shoe sole to the pedal axis. This action further eliminates ambiguity in determining the shortest distance from the spindle axis to the shoe supporting surface. In addition, it provides a height definition that corresponds to the actual height of a shoe supporting surface that a cycling shoe will interface with under actual use.

Furthermore, the height of the binding is measured by the same cylindrical gauge, in order to represent an actual shoe sole which might come in contact with the top surfaces of the binding. Since safe, secure, and efficient pedaling can only be performed when the ball of the foot is over, or slightly in front of the pedal spindle axis, the cyclist will strive to place the cylindrically curved part of the shoe, also known as the forefoot and represented by the cylinder, over the pedal spindle, whether using the

pedal in clipless binding mode, or in unbound mode. To provide for this, the second cylinder for measuring the height of the binding is constrained to move with its axis held in a plane defined by the spindle axis and the first cylinder axis.

Having provided precise and unambiguous definitions of height for both bindings and shoe supporting surfaces that provide proper verification of the two types of functionality (clipless binding or unbound mode) claimed in the present invention, claim 30 can thus recite the two required heights of bindings relative to shoe supporting surfaces provided by said means [for providing variable relative height between bindings and corresponding shoe supporting surfaces] that are necessary to provide the novel functionality of the present invention.

All ambiguity of height measurement is thusly removed from claim 1 (new claim 30), by the substitution of this new height definition and Applicant submits that Examiners second and third objections to claim 1 regarding 35 USC 112 is overcome. Applicant submits that Claims 2-7, and thus by extension, new claims 31-34, being dependent on claim 1 (new claim 30), and otherwise not having any other deficiency regarding 35 USC 112 are also now in compliance with 35 USC 112.

With regards to Rejections of Claims 1-6 under USC § 102 (Item #12):

Claims 1-6 were rejected as unpatentable over Ueda '930. Examiner states that Ueda '930 discloses, in figures 2-5B, 9 and in lines 3-24 of column 3, among other things, a height variability linkage (not numbered) having an outer tube 15, an inner tube 16, a pair of stops 20, and a spring 26. Examiner states that the relative height variability linkage of the present invention has not been given patentable weight due to being narrative in form.

Claim 30 now recites a "means" for providing relative height variability between each binding and its corresponding shoe supporting surfaces, rather than a "linkage", that provides sufficient height variability to allow both clipless binding and unbound pedalling. Applicant submits that claim 30 is now written in accordance with the

requirements of 35 USC § 112 ¶6 to produce a proper means plus function recitation of structure rather than a narrative recitation, and this recitation, being equivalent to a structural recitation and thus having patentable weight, satisfies the requirements of 35 USC 102. The following comments are offered as further evidence that the present invention is not anticipated by any prior art, in particular Ueda '930:

Applicant finds no explicit mention of a height variability linkage in Ueda '930. Lines 3-24 of column 3 describe, among other things, a linking member (4) that is arranged to be concentrically rotatable relative to a tread cage (5). It is unclear whether or not Examiner is construing these members to constitute a height variability linkage. Ueda '930 presents essentially the same invention as Ueda, U.S. Patent No. 5,784,931, namely, a clipless bicycle pedal having a set of clipless bindings and a tread cage surrounding the bindings which is rotatable relative to the bindings about the spindle axis. Since both the tread cage and the clipless bindings rotate about the pedal axis, neither of these elements are height variable, when the heights of these elements (distance from spindle axis to top surface of either binding or shoe supporting surface) are considered independently from each other. Ueda '930 contains no description, nor makes any claim for a bicycle pedal that can be used in a clipless, or unbound mode, unlike the present invention. Instead, Ueda '930 describes a pedal whose useful novelty is for providing additional side-to-side shoe stability when engaged with a cleat, which Ueda claims may not, by itself, provide sufficient side-to-side shoe stability. The present invention shows a linkage (43 or 143) which provides relative height variability between a binding and a shoe supporting surface whether or not these heights are measured independently from each other.

Claim 30 of this application recites a more specific definition of the heights of both clipless bindings and shoe supporting surfaces to replace previous definitions which were insufficient in the claims of the original application, and remained so in the claims of amendment B. Since there are differing ways to measure height, it is important to choose a method which mimics the geometry and action of a shoe against a pedal as closely as possible. These definitions of height are essential for properly defining the

novel functionality of a convertible double sided dual mode bicycle pedal for the following reason:

Safe, secure, comfortable, and efficient pedaling for any significant distance can only be performed when the ball of the foot is placed directly over or slightly in front of the pedal axis. A typical clipless binding cleat is normally attached to the shoe in this position. It is worth noting that almost all cycling shoes for use with fully recessed cleat use what is now the defacto industry standard Shimano SPD cleat attachment slots, which allow only one half inch (1/2") total fore/aft adjustment range of cleat placement. A typical shoe for cycling features a stiff sole, the forefoot portion of which has the general shape of a cylinder; this cylinder having a radius of curvature of generally about 8 inches, in the area under the ball of the foot. A pedal which cannot securely and comfortably support a shoe in this position will be unsafe and uncomfortable to pedal for any appreciable distance. Thus, the height of either a clipless binding or a shoe supporting surface is only properly described by specifying that the height measurement be made generally along a line connecting the pedal axis to the ball of the foot, as viewed from the side. Any height measurement made along a substantially different line of direction will have little relevance to its shoe supporting function.

The pedal of Ueda '930 provides relative height variability between a binding and a corresponding shoe supporting surface when the heights of these components are measured in accordance with the method of claim 30. However, the lack of a safe, secure, and efficient unbound mode becomes especially clear, as the lowest height of the binding relative to the shoe supporting surface occurs when the binding is in position for use in clipless binding mode, with the cleat engaged. When the binding is rotated to any other position relative to the tread cage, such as when the cleat is disengaged from the binding, the height of the binding relative to the corresponding shoe supporting surface is increased, rather than decreased. As such Ueda '930 does not contain a height variability means (for either the bindings or shoe supporting surfaces) sufficient to allow the pedal to be used in either unbound mode or in clipless binding mode. Clearly, this pedal was designed to facilitate cleat engagement under any circumstance. As such it

does not contain the structure recited in claim 1 (new claim 30) providing sufficient relative height variability between a binding and a shoe supporting surface that allows usage of the pedal in either unbound mode or in clipless binding mode, and thus it does not anticipate the present invention under USC §102.

The pedal of Ueda '930 can only be ridden in unbound mode (with a shoe having a sole recessed cleat) by placing the foot on the pedal with cleat well to the rear of the pedal axis to avoid engaging the front cleat engaging members, or with the cleat well to the front. The foot rearward position, even if the rotation of the binding with respect to the tread cage was stable under pressure (for example by locking the relative rotation between the bindings and the tread cage), would be uncomfortable and inefficient for any length of time, as the ball of the foot would be located substantially rearward of the pedal axis and a substantial additional plantarflexion of the foot would be required to keep the rider's foot level and prevent it from slipping off the pedal to rearward. In addition, if the rotation of the binding with respect to the tread cage was stably locked against foot pressure, the part of the shoe sole in front of the cleat would be supported not on the tread cage, but upon the front cleat engaging member which is small, hard and smooth, with poor shoe gripping qualities. However, since the binding is must be free to rotate, in order to allow cleat engagement with the binding, when the shoe is placed in this rearward position, shoe pressure on the front cleat engaging members acts to rotate the bindings relative to the tread cage which raises the rear cleat engaging member relative to the rear tread cage surface. The result is that the shoe then becomes supported on two points; the cleat is supported on the top surface of the rear cleat engaging member, and the sole portion in front of the cleat is supported on the top surface of the front cleat engaging member. Neither point of support is safe, secure, or comfortable, and cannot transmit power efficiently from the rider to the pedal. The tread cage is effectively prevented from supporting the rider's weight by the rotating action of the binding. The foot frontward position is similarly unsafe and uncomfortable. This position would place the riders instep over the pedal axle, transmitting pedalling force through the instep. This becomes painful after a very short period, even with rigid

soled cycling shoes. Also many cycling shoes do not have an outsole tread in this area, a(s shown in the drawings of Ueda '930), and only have a smooth rigid plastic sole that is slippery against metal. Thus the only secure foot supporting mode in the pedal of Ueda '930 which allows for safe and efficient pedaling is with the cleat affixed to the binding. The above remarks also apply to the second embodiment of this patent. As such, the invention of Ueda '930 does not anticipate the present invention.

With regards to Rejections of Claim 7 under USC § 102 (Item #13):

Examiner rejects claim 7 as being an obvious variant of the preferred embodiment, whereby one binding and any associated support means is eliminated from the preferred embodiment. Applicant acknowledges claim 7 as being obvious, and thus unpatentable over the basic invention of claim 1, and by extension, Ueda '930 (claim 1 being rejected). Claim 7 is cancelled. New claim 30 explicitly provides for the second binding to be optional by the recitation in section (d) of :

--"...said second shoe supporting surface optionally being configured to at least partially surround an optional corresponding:

(e) second clipless shoe binding located below said spindle,..."--

With regards to additional prior art references cited by the Examiner (Item #15):

U.S. Patent 6,453,771 B1, Takahama, et al. shows a pedal having a tread cage made of a resilient material to provide variable height relative to a fixed body. The downward deflection under foot pressure, and resulting distorted shape of the tread cage is designed to facilitate cleat engagement and is not designed to support a shoe for safe, comfortable and efficient unbound operation. Like the pedal of Ueda '930 it provides only very limited unbound operation, requiring a foot placement upon the pedal which is substantially askew relative to a proper pedaling position with the ball of the

foot placed substantially over the pedal spindle axis, and the sole of the shoe is placed squarely upon the pedal, as viewed from the front or rear. As such it does not anticipate the current invention.

U.S. Patent 6,393,940 B1, Takahama, et al. shows a pedal having a tread cage that is rotatable relative to a pedal body having clipless binding mechanisms provide variable height relative to a fixed body. This invention is essentially the invention of Ueda '930, with the addition of a means for adjusting the angle of the tread cage relative to the body. The addition of this angle adjusting means is for the purpose of accomodating a wider variety of shoe soles. As such it does not anticipate the current invention.

U.S. Patent 4,893,523, Lennon shows a pedal having both clipless binding and unbound capability. The binding platform is formed to be a broad flat surface which is capable supporting a shoe that does not have a cleat or stud protruding from the sole. The binding platform has an aperture designed to engage with a stud that is affixed to the shoe sole and which protrudes substantially outward from it. It is not designed to engage a cleat or stud recessed within a shoe sole. As such, it does not provide both clipless and unbound operation with a cycling shoe having a sole recessed cleat, and thus does not anticipate the current invention. Furthermore, the binding platform has a cutaway section off to one side to facilitate stud engagement and allow the placement of the shoe upon the platform without cleat engagement, thusly providing a limited form of unbound operation with a shoe having a protruding stud. However, like the invention of Ueda '930 operation of this pedal with such shoe having a protruding stud requires placement of the foot askew upon the pedal, in a non-optimum position for pedaling, with the foot placed laterally outward and rearward of the postion used for clipless binding operation. Furthermore, the smooth surface of the platform is necessary to facilitate stud engagement, but provides a slippery, unsafe surface for unbound operation. The dished teeth shown on the perimeter of the platform appear to be at the same or nearly the same height as the platform making them useful for traction only if

the shoe is tilted in an unnatural position. Thus safe, comfortable, and efficient unbound pedalling cannot be performed with any shoe with this pedal, and like, Ueda, it is designed primarily for clipless binding operation only. As such it does not anticipate the current invention.

The pedal of Hlavac, U.S. Patent No. 4,599,915 shows a platform pedal having a platform surface that is angularly adjustable about a longitudinal axis, in order to provide comfortable cycling for people who have foot or leg deformities, or otherwise cannot pedal comfortably on a horizontally level pedal platform. It does not have a height variable shoe supporting surface as the longitudinal axis of rotation intersects substantially the spindle axis (fig. 2). Furthermore, it does not have clipless binding capability, and such capability could not be added without losing unbound capability. As such it does not anticipate the current invention having both clipless and unbound pedal operation modes.

The pedal of Lin, U.S. Patent No. 6,085,614, shows a pedal having a tread cage rotatable relative to a clipless binding pedal, similar to Ueda '930. The improvement consists of an improvement in the spring biasing mechanism that provides rotation bias between the tread cage and the pedal body. No improved functionality of operation results over Ueda '930, only an improvement in serviceability and manufacture. As such it does not anticipate the present invention.

The pedal of Chen, U.S. Patent No. 6,070,493 shows a pedal having a fixed height tread cage, having an upper and a lower unbound shoe supporting surfaces and two corresponding variable height clipless bindings for use with a cycling shoe having a fully sole recessed cleat. The height variability of the bindings is very small, as can be seen comparing figure 6 with figure 7, and does not allow sufficient retraction of the bindings into the tread cage to allow unbound pedal operation with any type of shoe. The pedal of Chen '493 is designed to be used in clipless binding mode only and the function of the tread cage is to provide additional side-to-side support of the cycling shoe, with the sole recessed cleat engaged with a binding. In addition, the tread cage may provide unbound support for a shoe placed substantially askew upon the pedal, in

conditions where the cyclist cannot easily engage the cleat with the binding, similar to Ueda '930, and others. As such it does not anticipate the present invention having both safe, secure, comfortable and fully efficient unbound pedalling operation, and clipless binding operation.

The pedal of Chen U.S. Patent No. 5,802,930 shows a clipless binding pedal having a frame portion which is relatively rotatable relative to the clipless bindings about the pedal spindle axis, similar to the pedal of Ueda '930 and others. This frame is essentially only the rearward or forward half (it is not clear which) of the tread cage of Ueda '930, Chen '493, Chen, Lin '614, and others. Since the shoe contacting portion of this frame is wholly on one side of the spindle axis, the clipless binding must be employed as the other half of the unbound shoe supporting surface. Similar to the pedal of Ueda '930 and others, the top surfaces of the clipless binding are small and hard and do not provide safe, comfortable, or efficient shoe supporting surfaces. Furthermore, similar to Ueda '930 and others, the binding will rotate under foot pressure to facilitate cleat engagement, and it is required to place the foot substantially askew upon the pedal, in a non-optimal pedalling position in order to use the pedal in unbound mode. As such, it does not anticipate the current invention having both safe, secure, comfortable and fully efficient unbound pedalling operation, and clipless binding operation.

The pedal of Nagano, JP 03159893A shows a clipless binding pedal designed for use with a sole recessed cleat. It does not provide unbound pedalling operation, with either a cycling shoe having a sole recessed cleat, nor with any other type of shoe. The cleat and binding system of Nagano, JP 03159893A is representative of a number of similar sole recessed cleat and binding systems for which the present invention is designed. In the application of the present invention, Applicant clearly states that the nature of the present invention lies not in any particular aspect of a sole recessed cleat and binding system, but rather in the novel combination of a typical recessed clipless binding system with unbound shoe supporting surfaces which provide fully functional operation in both clipless binding and unbound modes. As such, the pedal of Nagano, JP 03159893A does not anticipate the present invention.

Hamilton/Wodiska, U.S. Patent No. 575,712, show a pedal with a moveable tread coupled to a shoe sole clamp mechanism. Downward movement of the tread under shoe sole pressure operates a shoe clamping mechanism which grips the sides of the shoe sole, thusly providing a limited degree of attachment of the shoe to the pedal only when downward shoe sole pressure is present. This type of attachment is fundamentally different from that provided by modern clipless pedals, in that attachment is not continuously maintained throughout the entire crankarm revolution. Furthermore, this pedal does not provide unbound pedalling operation with any shoe, as the .

When the foot moves through the upward part of the stroke, foot pressure on the movable tread is reduced or eliminated and the side clamping members retract away from the shoe sole, thus releasing it. Unlike modern clipless binding pedals , the cyclist cannot exert upward force on the pedal during this part of the stroke, leading to inefficient power delivery. Furthermore, even under downward foot pressure this type of attachment does not provide the security of attachment to a cleat designed specifically for the purpose of attachment. The degree of attachment is entirely dependent on maintaining downward pressure at all times, which is nearly impossible for a cyclist to perform, and would severely restrict the riding style of the rider while demanding continuous attention. Under typical use, a cyclist would quickly give up trying to maintain continuous downward pressure with the result that the side gripping clamps would engage and disengage every pedal revolution. This type of attachment would be unacceptable to modern cyclists who depend on the continuous and secure attachment provided by clipless binding/cleat systems. Furthermore, the teeth of the side gripping clamps would be likely to quickly destroy the shoe sole, due to the cyclic gripping action. Special soles would be required to withstand such action. Furthermore, the degree of attachment is self-limiting, in that the gripping action of the side gripping shoe clamps prevents further downward motion of the sole and platform actuator, which then limits the side gripping action. In a similar manner the action of the side gripping clamping members limit the downward pressure that can be applied to the platform actuator. It is thus impossible to apply full foot pressure to the platform actuator. The

movable tread is of a cantilevered design and does not appear to be designed with sufficient strength to fully support a rider's foot; it is designed primarily to actuate the side clamping mechanism, and only secondarily to provide partial support for the rider's feet. The angle of the lever coupling the movable tread to the side clamping members is small, with the result that a light pressure on the tread generates a high side clamping force. The side clamping action arrests the downward motion of the shoe and prevents higher forces being applied to the tread. Thus the movable tread need not, and appears not to be, designed to carry the full weight and pedaling pressure of the cyclists shoe. The movable tread is not designed to be locked in an unclamped foot position, and it is not obvious how to modify the design to do so, nor if it is possible to do so. As such the movable tread cannot be considered to be a shoe supporting surface, as it cannot support the riders shoe in an unbound fashion. The pedal does not truly show a height variable shoe supporting surface, nor does it show a clipless binding mechanism; it shows a partial clipless binding and a partial shoe supporting surface which must act in concert with each other to support a shoe, with partially clipless, (and cleatless) binding functionality. As such, it does not anticipate the present invention of a pedal having both safe, secure, comfortable and fully efficient unbound pedalling operation capability, and clipless binding operation capability.

Attached hereto is a marked-up version of the changes made to the specification of the original application by this current amendment. The attached pages are entitled "Version With Markings To Show Changes Made".

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Conclusion:

For the reasons given above, Applicant respectfully submits that the specification and claims are now in proper form, and that all claims define patentability over the prior art. Therefore, Applicant submits that this application is now in condition for allowance, which action Applicant respectfully solicits.

Very Respectfully,



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June 11, 2003

Derek Shuman, Sole Applicant



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Version With Markings To Show Changes Made

Specification:

Please replace the entire paragraph beginning on line 7 of page 5 of the application, as originally filed, with the following paragraph:

--Ueda, U.S. Patent # 5,784,931 (1998) shows a clipless bicycle pedal designed to engage a recessed cleat, having a spring loaded, rotatable tread cage surrounding the clipless binding. This design is a variation of the previous design of Hanamura, U.S. Patent #5,771,757, in attempting to provide contact between the tread cage and the shoe sole while the cleat is engaged with the binding mechanism. It is described, though not claimed, as providing a shoe resting surface for a cycling shoe when the cleat cannot be engaged, as encountered during many types of off-road bicycle racing. ~~However, the cage is only designed to rotate about the pedal axis to move out of the way to allow cleat engagement. It's height relative to the binding does not change.~~ No figure shows a shoe sole being supported by the cage alone. Under any significant foot pressure, the tread cage will rotate relative to the binding with the result being that the cleat engaging members of the binding protrude substantially above the top of the tread cage. Thus until the shoe is supported either on top of, or engaged with the binding. If the shoe is placed on the pedal with the ball of the foot over the pedal spindle axis, only a cleat engaged position will be stable, for if the cleat is not properly engaged with the binding, there is only as metal to metal contact between the bottom of the cleat and the top of the binding which is very slippery and insecure. If the shoe is placed on the pedal in a substantially different orientation, so as to avoid contact of the cleat with the binding, then the top surface of the binding contacts the sole of the shoe is supported primarily by the top of the binding, instead of the shoe cage. This is again, a slippery and insecure form of support. Furthermore, this foot position does not allow secure comfortable or and efficient pedalling. In order to have contact between the sole of the shoe and the top

of the tread cage, the shoe must be at least substantially tilted to one side or the other, which is again is not safe, secure, comfortable or efficient for pedalling. As such, the cage is not truly supportive of the rider's foot and cannot provide a stable shoe supporting surface for any type of shoe. As such this pedal cannot be considered a dual mode unbound/clipless pedal; it is a clipless pedal that attempts to provide a temporary surface for the rider to place their foot when terrain and/or speed prevent them from immediately clipping in to the binding. Thus this pedal design is not effective for use in unbound mode, and, like the design of Nagano, U.S. Patent #5,771,757 described above, is intended only to aid the rider in achieving cleat engagement under difficult circumstances. As such, it does not anticipate a bicycle pedal according to this invention, as it does not provide sufficient height variability between a binding and a shoe supporting surface to be comfortably and safely usable in either clipless or unbound mode. --

Please replace paragraph 16, beginning on line 38 of page 9 of the application, as originally filed, with the following paragraph:

-- Figure 8 is sectional side view of an alternative embodiment of a bicycle pedal according to this invention, as indicated by section lines 3A-3A on figure 1A, closely related to the preferred embodiment, but featuring ~~a single variable height binding on one side of the pedal only.~~ bindings which retract further into pedal body.

Please replace the 3rd paragraph beginning on line 35 of page 17, of the application, as originally filed, with the following paragraph:

--In a variation of the the preferred embodiment, shown in fig. 8, shoe supporting surfaces 15 of pedal body 14' are placed slightly higher (further apart from each other) and links 42' made slightly longer to allow a corresponding increase in the distance between pins 38F and 44 and between 38R and 44 thusly providing further retraction of bindings 32 into pedal body 14'. This may provide better shoe sole grip for worn down

shoe soles, and possibly allow the use of certain non-sole recessed cleat and binding systems by allowing the cleat to protrude into cutout 30. Fig. 8 also shows a precise method for measuring the heights of both bindings and clipless shoe supporting surfaces. A first gauge comprising a cylinder of radius 8 inches, which corresponds to the forefoot section of a typical cycling shoe of average size, and having its axis held parallel to the spindle axis, is fully impressed against a shoe supporting surface 15 to find the line of tangency of minimum distance from the spindle axis, thus simulating a shoe supported by the shoe supporting surface, in proper position for safe comfortable and efficient pedaling. This distance from the spindle axis to this line of tangency is denoted HS. A plane is then constructed through the axis of the cylinder gauge and the spindle axis, denoted in fig 8 by the centerline. The two possible heights of the corresponding binding are defined by the position of a second cylindrical gauge of the same radius as the first, whose axis is constrained to be parallel to the spindle axis and to move only in the previously described plane, the cylinder tangent to the binding on its generally uppermost facing surface or surfaces. These distances are denoted HB and HB' for bindings in the retracted (for unbound operation) and extended (for clipless binding operation) positions respectively. --

Please replace the paragraph beginning on line 6 of page 21 of the application, as originally filed, with the following paragraph:

--The description above is detailed and specific, showing only several embodiments out of many possible ones which provide the same novel functionality. As such, the invention is not limited to the description in scope. For example, new materials or fabrication methods may be substituted for the suggested ones in the description, and parts may be changed in size and shape to reduce weight, and costs, to increase strength and durability, or to improve performance, especially in adverse conditions such as the presence of mud or dirt. ~~For instance, in the preferred embodiment, shoe supporting~~

~~surfaces 15 could be placed slightly higher (further apart from each other) and links 42 made slightly longer to retract bindings 32 further into pedal body 14. This might provide better shoe sole grip for worn down shoe soles. It could allow the use of certain non-sole recessed cleat and binding systems by allowing the cleat to protrude into cutout 30.~~ There are other possible mechanism configurations which provide similar functionality. As an example, it is possible to modify the alternate embodiment by affixing bases **134** to rear rail connector plates **146L** and **146R**, and affixing bail pivot pins **138** to front rail side plates **144L** and **144R**, in order to provide height variability in both the binding and the shoe supporting surfaces. This slightly reduces the total height of the pedal when operating in unbound mode. It would also be possible, and obvious to combine the main features of both the preferred embodiment with those of the last alternative embodiment, including the automatic conversion to unbound mode upon cleat release from the binding. There are other existing bindings possible which can be substituted, some of which are simple enough to be formed contiguous with a connecting linkage. Other possible bindings exist which can be substituted that have no moving parts. Other bindings which engage a non-sole recessed cleat may also be used to advantage, as the cleat could protrude slightly into cutout **30**. The shoe supporting surfaces **15** of the preferred embodiment may be shaped differently than shown, such as flat, rather than curved. They may have less surface area shown, to provide extra clearance for muddy conditions. The shoe supporting surfaces of the preferred embodiment may consist of traditional cages, similar to the last alternative embodiment, rather than broad surfaces, though this might limit its compatibility to certain types of shoe sole designs. The need to seal, or otherwise protect the moving mechanisms against dirt and water is obvious and the addition of features not described here can be anticipated, such as shaft seals for exposed rotating parts, flexible boots for exposed sliding parts, gaskets, surface hardening treatments, the addition of rolling elements to replace sliding surfaces or elements, dry-film surface lubrication treatments, surface corrosion protection treatments, surface texturing treatments, or features to provide better shoe grip, etc. The second alternative embodiment described here,

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having only one binding, but retaining some of the parts necessary for operation with two bindings can obviously be simplified for cost savings, at the expense of being easily convertible to the preferred embodiment, by the simple addition of another binding. Similarly, the last alternative embodiment can be reconfigured to provide for lighter weight, lower cost, and to provide other improvements.--